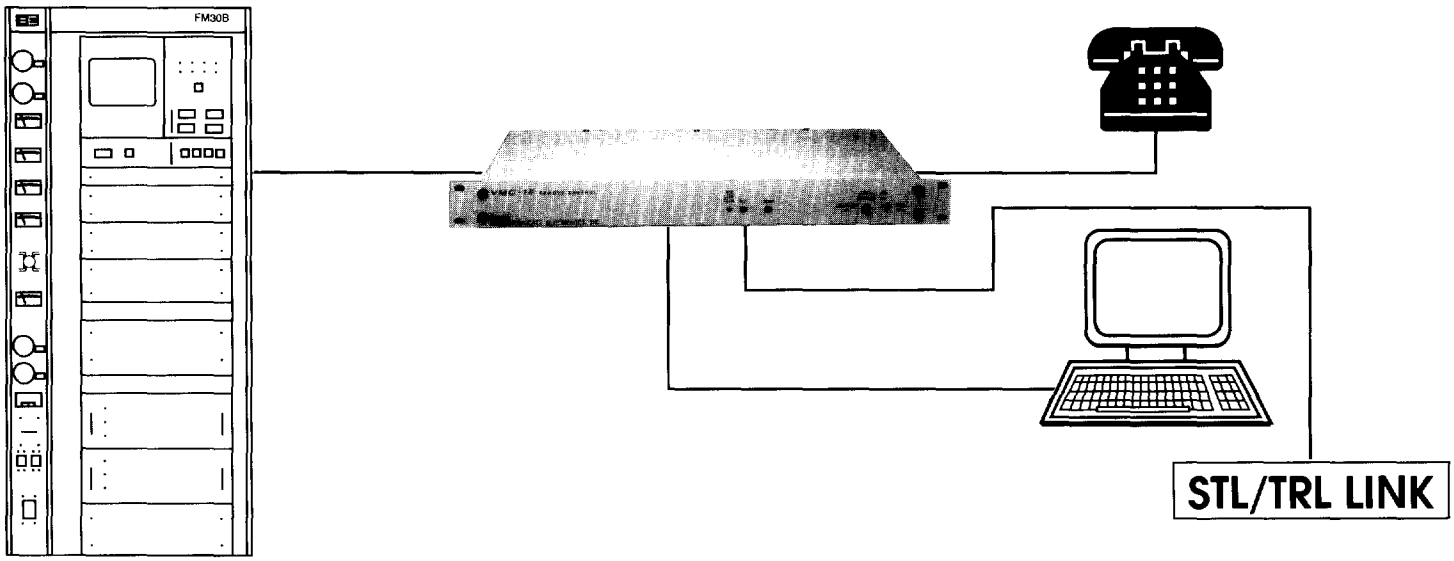
BROADCAST ELECTRONICS, INC.

Appendix E

Examples of "Smart" Transmitter Controllers Suitable for Unattended Operation of Complex AM Directional Systems

BROADCAST ELECTRONICS

VMC-16 REMOTE CONTROL SYSTEM



The VMC-16 Remote Control System provides continuous monitoring of your transmitter or other remote site using standard dial-up phone lines. Meter readings and other data are relayed to the remote operator in clean, clear, human voice. Control instructions are made through any standard TOUCH TONE telephone. The VMC-16 will dial preset numbers and announce any alarm conditions, should they occur.

CONTROL FEATURES/BENEFITS

- Controlled over standard, dial-up phone lines. Any phone with a TOUCH TONE keypad can be used to control or interrogate the remote site.
- Two levels of password access assure that only authorized personnel perform critical control functions.
- 32 relay contact closures are grouped into 16 channel pairs for simple, straightforward "on/off" or "raise/lower" control on demand.
- Parameter Tolerance Monitor continuously scans all conditions. If any value or status is improper, pre-programmed actions can be taken, and the unit can phone up to three emergency numbers.
- Internal Clock/Calendar, with battery back-up, can be programmed for up to 99 events. These events can be reoccuring on a regular schedule or can be periodic such as a monthly pattern change times.
- Fail-safe circuit monitors up to eight conditions simultaneously, as programmed. Improper values or status conditions from any of these for more than five minutes causes closure of fail-safe relay.

MONITOR FEATURES/BENEFITS

- 20 user definable input channels monitor the value or status, as programmed.
- All monitored data reported via human voice message.
- Automatically dials up to three pre-programmed 12 digit phone numbers then announces alarm conditions.
- Two additional channels monitor temperature.
- Audio from front panel condensor microphone or auxiliary line input can be monitored remotely.
- Calibration of values is a one-person operation and does not need to be routinely repeated.

®

BROADCAST ELECTRONICS INC.
4100 N. 24th St.
P.O. Box 3606
Quincy, IL 62305-3606

VMC-16 SPECIFICATIONS

Installation of the VMC-16 is simple and straightforward. Do as little or as much programming as you wish. Corrective actions can be pre-programmed in case any value or status goes out of tolerance. Up to 99 actions can be programmed by date and time. All programming is stored in EPROM memory, which does not lose programming in the event of a power loss and does not require batteries.

Temperature Sensor Range: −40°F to +230°F Standard
−40°C to +110°C Optional

Analog/Status Channels: 20

DC Sample Voltage: 0 to 7 vdc, referenced to ground

DC Sample Accuracy: ±.5% (10 bit resolution)

A/D Conversion Time: 88 microseconds

Clock Accuracy: ±1 second per month

Programmable Clock Functions: 99

Set-up Memory Retention: >5 years without power

Relay Closure: 32 "form C" contacts grouped in pairs to 16 channels, 1 amp contacts

Fail Safe: 5 minutes of sustained condition from any of eight inputs

Input/Output Connections: Screw barrier strips

Voice Synthesis Type: Linear Predictive Coding (LPC)

Clock Battery Type: Standard AA (three)

Computer/Printer Port: RS-232

Internal Modem: 300 baud

Size Relay Panel: 19 in. (48 cm) wide × 1 in. (3 cm) deep × 5¼ in. (13 cm) high
Control Unit: 19 in. (48 cm) wide × 7¾ in. (20 cm) deep × 1¾ in. (5 cm) high

Weight: Relay Panel: 2 lbs. (1.02 kg)
Control Unit: 3 lbs. (1.36 kg)

Ordering Information:
VMC16 907-0016 Voice Remote Control System

Broadcast Electronics... Recognized Leader in Radio Broadcast Technology.

BROADCAST ELECTRONICS INC.
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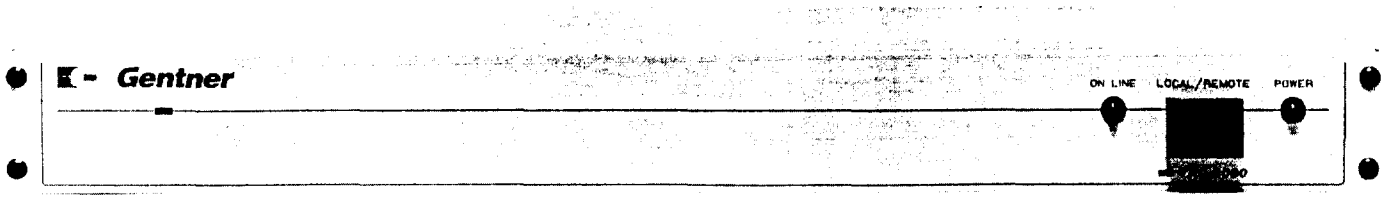
Printed in U. S. A.



VRC-2000 Remote Control

YOU'RE HERE, THE TRANSMITTER'S WAY OUT THERE.

Keeping an eye on everything that's happening at your station is a full time job. Talent, salespeople, billings, promotions, your overall sound, studio maintenance, whether your profitability is where it should be. With the hectic pace of the studio, you don't have a lot of time to think about your transmitter...so how do you know everything's working correctly out there?

The answer is Gentner's VRC-2000 Remote Control. It not only monitors your transmitter, it can make changes for you automatically or at specific times of the day. And, if something goes wrong, it calls you or your technical staff to report the problem. The problem can often be fixed just by giving the VRC-2000 a few simple commands....and the VRC-2000 can fix many problems by itself. It's like having a person on duty at the transmitter 24 hours a day.

NO DEDICATED STUDIO UNIT REQUIRED.

The VRC-2000 was the first remote control system to give you access from virtually anywhere... your home, your office, a contract engineer's office in a different city, a restaurant, corporate headquarters, or at the studio. You can call it from a telephone - or use a PC with a modem - or use a bi-directional audio link or radio link. The VRC-2000 can respond either verbally, using a synthesized voice, or can give you conditions-at-a-glance on a PC screen. You "talk" to the VRC-2000 with the touch tone pad on your telephone, or with your PC.

SECURE ACCESS.

With this flexibility of access, it's important to make sure that only authorized persons can use the VRC-2000. Three levels of access are permitted — inquiry only (checking conditions), changing transmitter conditions (correction of problems), and programming (VRC-2000 setup). Many stations use all three levels: inquiry level for scheduled transmitter readings; correction of problems for the contract engineer; and programming level for the technical director. To gain access to the VRC-2000, any user must enter an access code on their telephone keypad. If the code is entered incorrectly, the VRC-2000 denies access. And, if the code is entered incorrectly 3 times, the VRC-2000 calls you to advise of the unauthorized access attempt.

REMOTE CONTROL

APPLICATIONS

Gentner's VRC-2000 can provide complete transmitter remote control for AM or FM radio stations; it monitors conditions, makes power changes, and logs automatically. Television stations can use the VRC to monitor critical portions of the transmitter and provide important "trouble-shooting" information quickly. The VRC-2000 can also be used in non-broadcast applications for translators, repeaters, microwave sites, or test sites.

Join the 4000+ satisfied VRC-2000 users. Call Gentner or your equipment dealer today.

Gentner

Telephone
1-801-975-7200

Facsimile
1-801-977-0087

VRC-2000 FUNCTIONAL DESCRIPTION

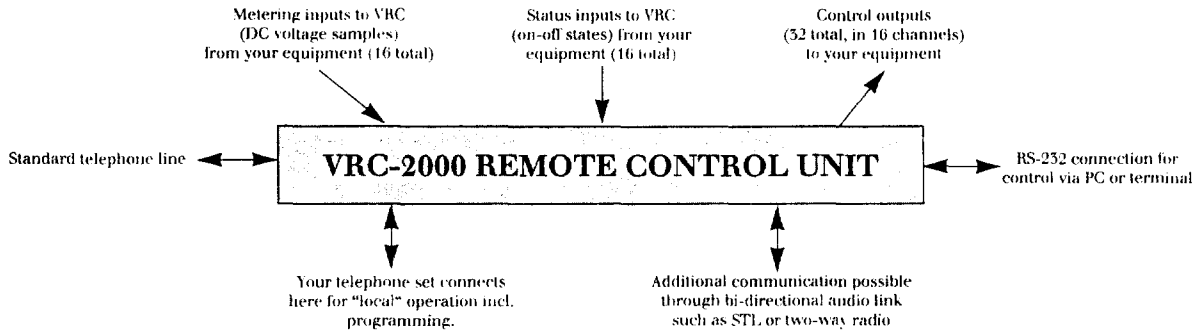
The VRC-2000 Remote Control Unit features 16 single-ended analog input channels for use in metering, 16 TTL-compatible input channels for use as status monitors, and 32 "open collector" transistor outputs for use as remote "switches" to generate control commands. The 32 outputs are configured as 16 separate Command channels, with 2 outputs per channel.

The unit provides four tolerance limits on each Metering channel, two upper and two lower limits. The user can program the VRC-2000 to provide different responses on the primary and secondary tolerance levels, such as attempting correction on the first level but placing an alarm telephone call on the second.

Alarms can be addressed to different telephone numbers. Voice or data modes can be used for alarm reporting, and the unit can be set up to simply report the problem or accept corrective action. User defined security codes provide three levels of access to the unit.

User setup information is entered into the VRC-2000 through a series of DTMF tones. A PC program, SETUP VRC, is supplied with the VRC-2000 to facilitate setup and speed programming time. The SETUP VRC program can also be used as a terminal emulation program for monitoring and control via PC. All setup information is saved in battery-backed up RAM so that information is retained even if the unit loses power.

Automatically initiated commands can be established to occur from any of three sources: any Status Channel condition, any Metering Channel tolerance limit being exceeded, and up to 64 real-time initiated functions.



VRC-2000 Remote Control

ELECRICAL SPECIFICATIONS:

Physical dimensions

19" W x 1.75" H x 10" D (1 RU)
48.3 cm x 4.75 cm x 25 cm

Power requirements

117/234 VAC, 50-60 Hz, 15 W

Input/Output connectors

37D, male (interconnection cables available from Gentner)

Type of system

Microprocessor-based with real-time clock

Command Capability

32 outputs, configured in 16 channels with two outputs each.
Open collector outputs, rated at 48VDC, 250 mA

Metering Capability

16 channels, resolution of 1:1024, 4 digit, overall accuracy of +/- 0.5%.
-5 to +5V, or 0 to 10 VDC range; current inputs can be accomodated.
Channels can be calibrated as linear, power, or indirect inputs.

Status Capability

16 TTL-compatible Status Channels

Interconnection Circuit

Standard toll-grade telephone circuit or dedicated 2-or 4 wire inter connection with toll grade performance.
FCC registered.
Automatic answering.
Sub-carrier or bi-directional audio link, or two-way radio link also possible.

Data Interface

RS-232 serial communications port with internal modem, capable of 300, 1200, or 2400 bps.

Temperature range

0 to +50 degrees C.

Gentner

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1825 Research Way, Salt Lake City, Utah 84119

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1-801-975-7200

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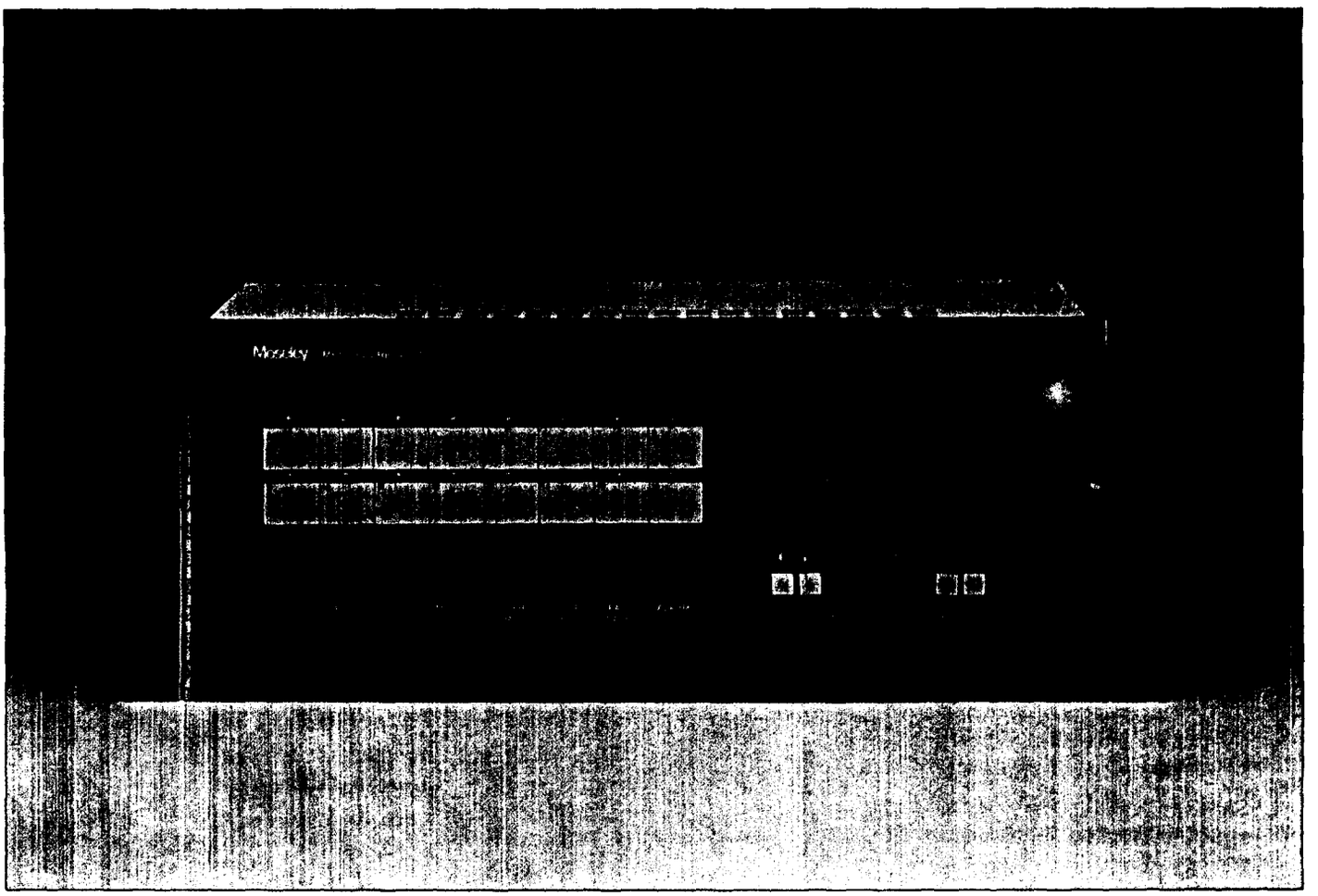
1-801-977-0087

Moseley



MRC 1620
Microprocessor Remote Control

MRC 1620 SCADA System

The MRC 1620 Remote Control is an intelligent, integrated Supervisory Control and Data Aquisition (SCADA) system that offers flexibility and sophistication in an economical and dependable package for general remote control applications in the energy, utility, transportation and telecommunication industries.

Configuration

The MRC 1620 system consists of a Remote Terminal that allows an optional Control Terminal or IBM PC with TaskMaster20 software to monitor and control a remote facility from both dedicated and/or dial-up control points. The MRC 1620 Remote Terminal comes equipped with 32 relay isolated command outputs (16 raise/16 lower), 16 TTL status inputs and 16 analog metering inputs with the required terminal connectors.

Accessible

In broadcast applications, the system may be configured as a standard Remote Control with a Control Terminal at the studio and the Remote Terminal at the transmitter. The Remote Terminal may also be interrogated over dial-up lines using the TaskMaster20 software and modems. The TaskMaster20 can also be used to directly connect a PC at the Control or Remote Terminal for automatic logging and automatic controls.

Intelligence

Telemetry limit checking and status alarm capability ensure that an unmanned facility operates at peak efficiency. During alarm conditions, intelligent, automatic corrective action can be taken by the Remote Terminal under the direction of the TaskMaster20.

Communication

The Remote Terminal comes equipped with a built-in internal 1200 baud modem to communicate over dedicated circuits (STL/TSL/FMSCA or 2/4 wire leased lines). An external 1200/2400 baud auto-answer modem for dial-up access over the public switched telephone network is also included with the Remote Terminal. This modem can be moved to the Control Terminal should dial-up access be available only at that location.

Set Up

System set up and calibration are done at the Remote Terminal with eight color coded buttons. For each channel, upper and lower telemetry limits may be set or disabled independently and may be calibrated in either power, indirect power, linear or microvolt mode. Status inputs may be set to display direct or inverted and may be programmed to trigger an alarm on rising, falling, or rising and falling waveforms.

Non-volatile memory is standard in the MRC 1620. In the event of a power-down, all set-up data, calibration and limits are stored in an EEPROM for up to ten years.

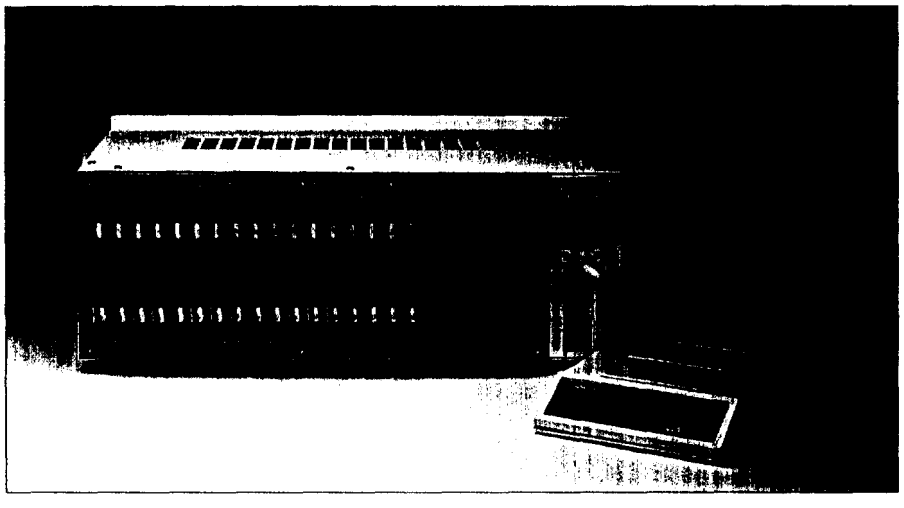
Operation

The MRC 1620 Remote and Control Terminals are simple to operate and easy to understand. All status channels are simultaneously displayed on a set of 16 LEDs. The front panel displays read-outs of selected channel number and telemetry data. LEDs indicate operation mode, alarms and other system parameters.

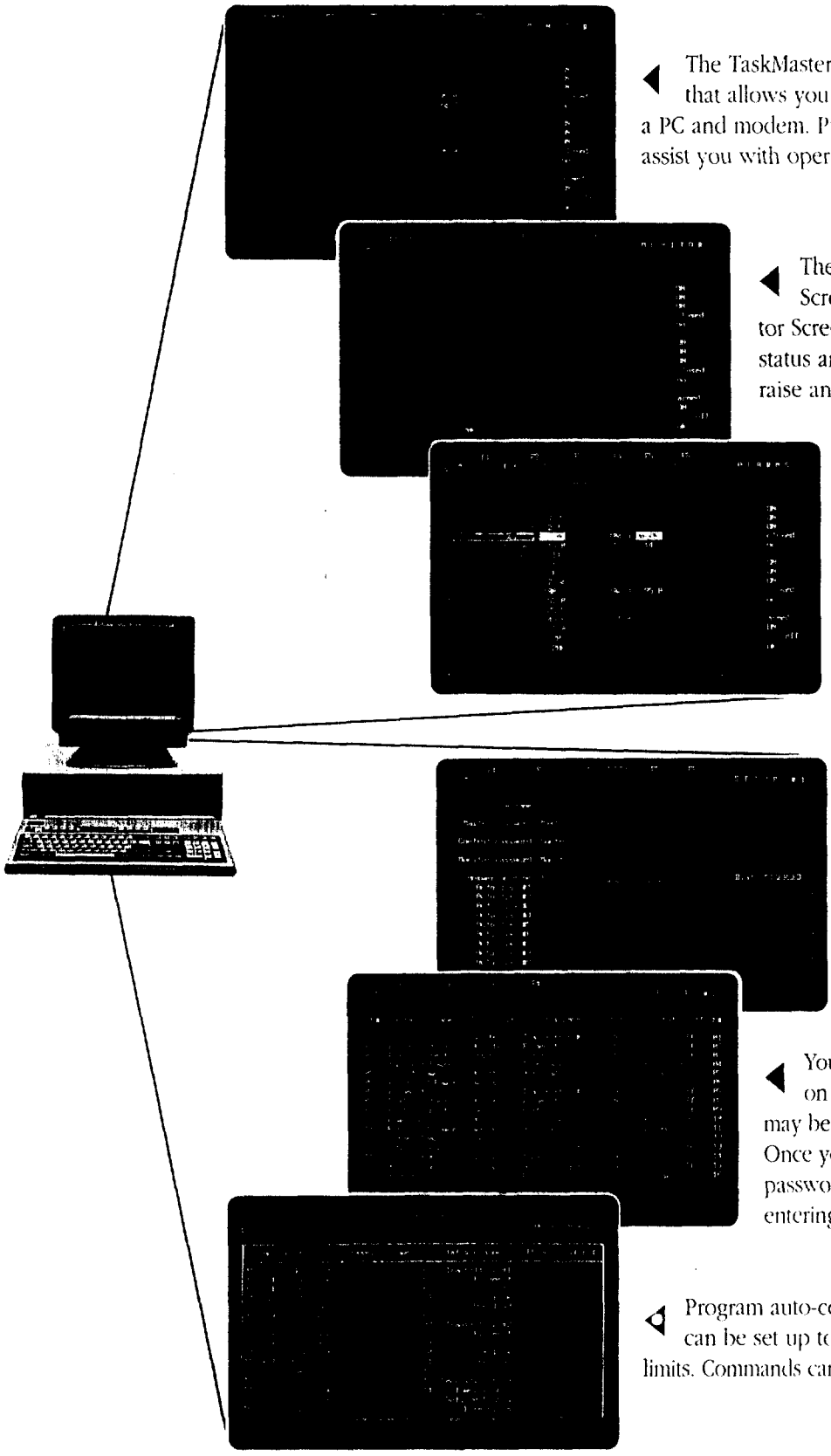
The MRC 1620 constantly checks telemetry and status data for each channel against assigned limits. Out of parameter conditions immediately trigger an audible and visible alarm. The front panel allows the operator to issue commands to either raise or lower the telemetry values to bring that channel back within limits. The telemetry and status channels also have an optional muting feature.

System Diagnostics

The MRC 1620 maintains two special system test channels. One checks A/D conversions and provides an alarm when tolerance exceeds factory-set limits. The second gives the user read-outs of data link quality.



TaskMaster20 Software



The TaskMaster20 software is an easy to use software package that allows you to access and control your Remote Terminal via a PC and modem. Pull down menus are available on each screen to assist you with operation of the TaskMaster20.

The system automatically boots to the Monitor Screen for the site I.D. that you choose. The Monitor Screen allows you to view the parameters for all 16 status and telemetry channels. Use this screen to issue raise and lower commands.

Current alarm conditions are displayed and acknowledged on the Alarm Page. Up to 20 of the latest alarms and hourly log data from the last 30 hours can be logged at your convenience.

A three-tiered password ("Monitor", "Control" and "Master") environment protects your system. Only the "Master" password may change set-up information. Program the Site Name and password on the first Set-up Screen. Nine (9) auto-dial numbers are also programmable to directly call out to a TaskMaster20 when alarm conditions occur.

You customize your own channel and status labels on the second Set-up Screen. Remote setup attributes may be uploaded or downloaded from the MRC 1620. Once you have entered your site labels, status labels and password information, you can access any site by simply entering the site I.D. with the proper password.

Program auto-control information in the Auto Screen. Commands can be set up to be issued when a telemetry value exceeds its limits. Commands can also be initiated from a change of status condition.

Specifications

General

Type of system: Microprocessor-based Control and Remote Terminals.
Failsafe:
- Complies with current FCC requirements.
- Responds after failure of interconnecting circuit. User programmable from 1 to 9999 minutes (0 to 166 hours). Can be disabled.

Failsafe Output: RT SPDT relay contacts (Form C), 2A, 30 Vdc, non-inductive.
Alarm Indications: Visual and aural (both RT and CT). Aural alarm defeatable and remoteable.
Maintenance Override: RT only front panel control provides RT relay closure. SPDT relay contacts (Form C), 2A, 30 Vdc, non-inductive.

Interconnects

Classes: 2/4 leased line, FM subcarrier or combination.
2/4 wire:
- 600 ohm balanced line, nominal. Send level: 0 dBm, nominal.
- Receive level: -30 dBm minimum.
- Requires voice grade Series 422 (2-wire) or Series 420 (4-wire) [basic conditioning] data channel. [Formerly Series 3002—Bell System Technical Reference PUB-41004.]

Subcarrier (Optional):
- 2200 ohm nominal unbalanced line, in & out. Send level: 1.5V p-p, nominal.
- Receive level: 0.25 V p-p, minimum. Frequency modulation of subcarrier on a specific frequency between 26 kHz and 185 kHz.

Modulation: Two tone FSK. 1200/2200 Hz.
Data Rate: 1200 bits/s. Half duplex.
Serial Interface: RS-232 for direct or "AT" modem connection to PC 2400 or 1200 or 300 bits/s.
Data Format (all): 8-bits, no parity, 1 stop bit.

Command Functions

Number of Outputs: 16 raise and 16 lower.
Inputs: Front panel raise/lower buttons.
Outputs: SPDT (Form C) relay contacts, 2A, 30Vdc, non-inductive.
Response Time: 500 ms, typical.

Status Functions

Number of Inputs: 16 inputs
Inputs: TTL-compatible closures at the Remote Terminal. (3300 ohm internal pull-up resistors).
Input Filtering: L-C low-pass filter for each input.
Input States: User programmable for N.O. or N.C. contacts.
Indication: Front panel green LEDs at RT and CT. Changeable to red.
Response Time: 1s, typical, from status change to indication at the CT. 250 ms, typical, when commands are being issued from the CT.

Telemetry (Analog) Functions

Number of Channels: 16 inputs
Inputs: Analog ±4.5 Vdc maximum, single ended referenced to ground. Other inputs optional.
Input Impedance: 500 kOhm, nominal.
Input Filtering: L-C low pass filter for each channel.
Calibration: Via front panel buttons in millivolt, linear, power or indirect power mode. A minimum of 0.25 volts required for full-scale calibration (9999) to maintain stated accuracy.
A/D: One part in 4096 (12 bits + sign)
Measurement Accuracy: Better than 0.5%
Sample Rate: Greater than 9 times/second on displayed channel.
Response Time: 1s, typical, from an input change at the RT to indication at the CT. 250ms, typical, when commands are being issued from the CT.

Physical

Power (CT or RT): 100/120/220/330/240 Vac, 50/60 Hz, 30 W, typical.
Operating Temperature: 0-50C
Size (WxHxD): 49 cm x 18cm x 23cm (29" x 7" x 9")

Options

TaskMaster20: Single-site MRC 1620 PC Software requires IBM PC/XT equivalent or better.
MasterController: Multi-site MRC 1620/MRC 2 PC Software requires IBM PC/AT equivalent or better
Subcarrier Communications: Available on standard frequencies from 26 to 185 kHz

TaskMaster 20 Hardware Requirements

Minimum	Upgrade
Computer	
• IBM PC/XT or PS/2	• 286/386-based compatible
• 320KB RAM	• 640KB RAM or more
• Serial Port	
• Parallel Printer Port	
• 360KB Floppy Disk Drive	• 1.2MB or 720KB or 1.44MB
• 20MB Hard Disk	• 40MB Hard Disk or more
• Color Graphics Adapter	• EGA or VGA capability
Monitor	
• CGA Monitor	• Multi-sync Monitor
Modem	
• 1200 baud	• 2400 baud
• Hayes "AT" compatible Internal or external	
Printer	
• IBM compatible parallel printer	
Cables	
• Parallel printer cable	
• Modem cable if using external modem	
• Null-modem cable if using direct connect	
DOS	
• Version 3.0 or later	

Software Features

- Dial or direct connect to an MRC 1620 Remote or Control Terminal.
- Display current analog and status values.
- Display and acknowledge alarms.
- Manually control an MRC 1620 Remote Terminal (RT).
- Automatically control (via analog limits and status conditions) an RT.
- Display, edit, and store PC screen labels.
- Download and store the set-up parameters from the MRC 1620.
- Recall and upload the set-up parameters to the MRC 1620.
- Maintain and generate log file(s) from up to 16 RT sites at user-specified intervals during the day.
- Generate a printed log.

Moseley

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Flow General
Company
Phone: 805 968 9621
Telex: 658448
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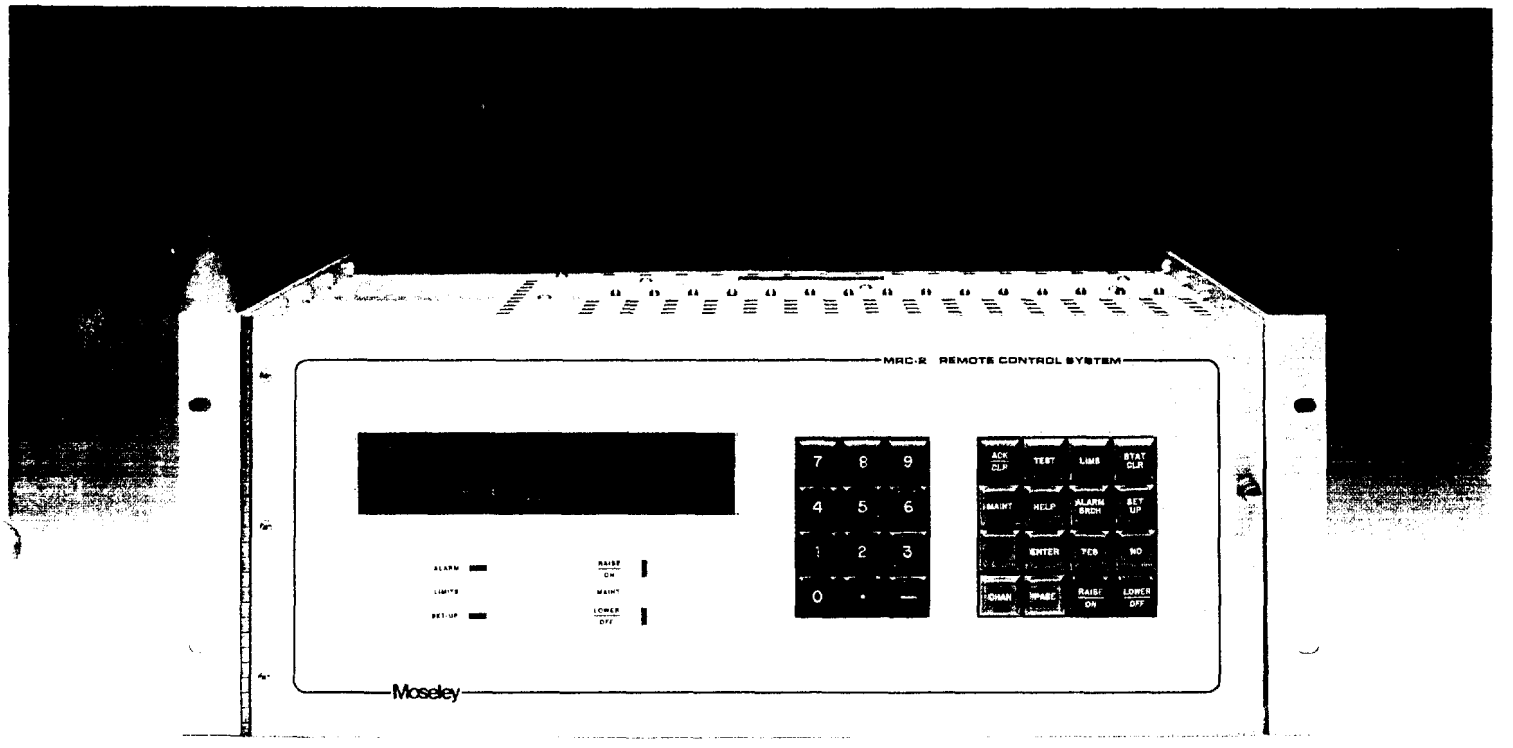


MRC-2
Microprocessor Remote Control

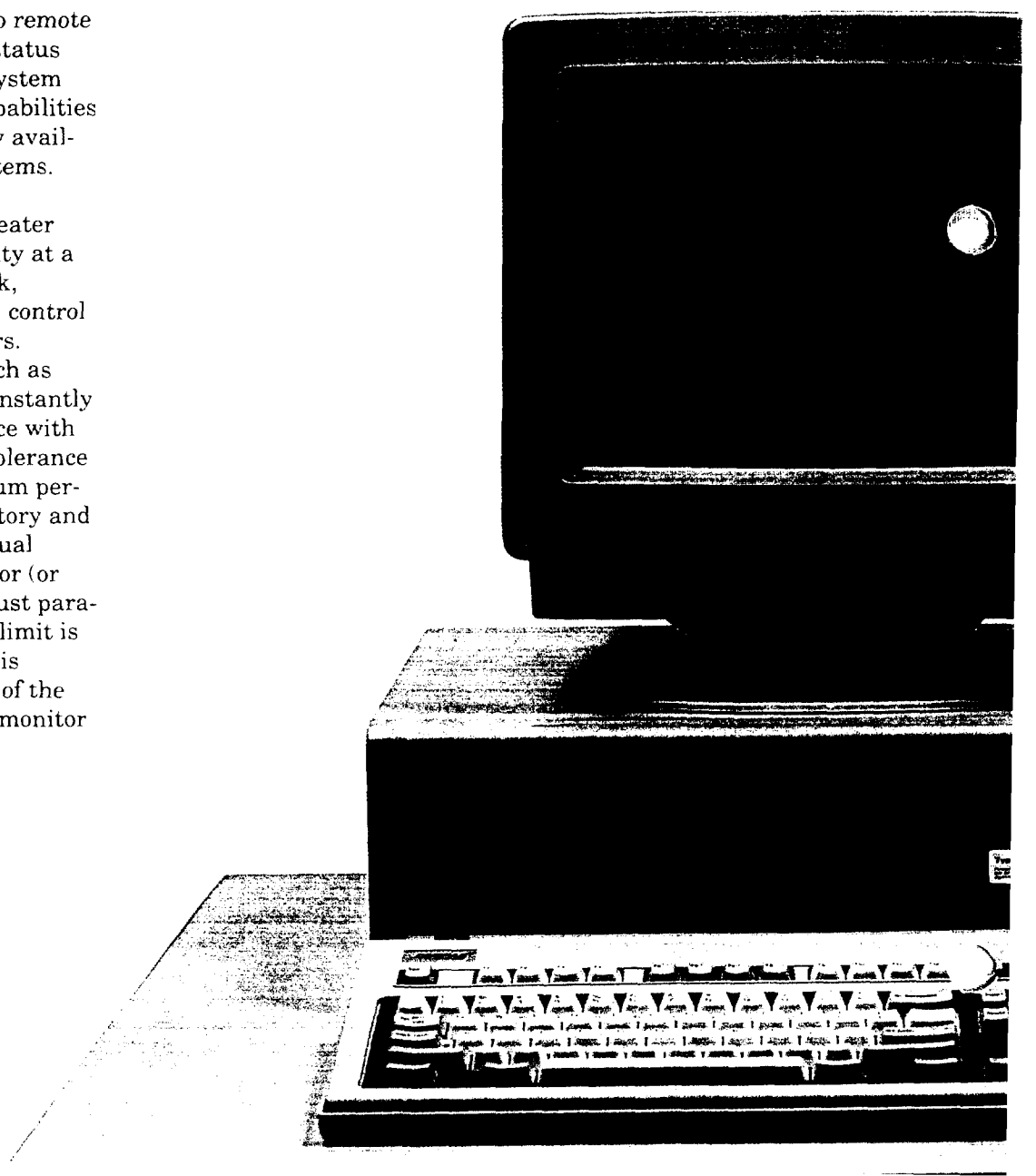
Why an MRC-2

The MRC-2 is an ideal SCADA product for telecommunications (i.e., paging, microwave repeater stations, VHF/UHF mobile networks, cellular and rural telephone systems), utilities (i.e., aviation, oil, gas, power, water, security), and broadcast applications (i.e., radio, television, program routing networks, ENG control, remote pick-up networks, transposers/ translators). It brings a new level of sophistication to remote control, telemetry and status acquisition and offers system size and operational capabilities unmatched by currently available remote control systems.

The MRC-2 achieves greater plant control and security at a lower cost through quick, positive monitoring and control of all desired parameters. Critical parameters, such as power output, can be constantly monitored for compliance with user pre-programmed tolerance limits, allowing maximum performance within regulatory and safe operating limits. Dual limits allows the operator (or the system itself to adjust parameters before a critical limit is reached. Plant security is improved by the ability of the MRC-2 to continuously monitor the facility for intrusion, fire, or any other occurrence that could endanger the plant or its surroundings.

The MRC-2 not only moves the technical operations of the remote site to the control point, it also frees technical personnel from the need to operate the plant, reducing or eliminating human intervention from plant operation.

The MRC-2 is a true building block system. The basic system consists of one Control Terminal, along with one Stand-Alone Remote Terminal or one Remote Terminal with Data Acquisition/ Command Unit. Multiple



SPECIFICATIONS

Type of System
- Microprocessor-based, distributed intelligence

Types of Memory Used
- Programmable Read-Only Memory for system firmware
- Electrically-Alterable Read-Only Memory for user programmed functions
- Firmware and user-programming nonvolatile, intact during power failure; no battery backup required

Real-Time Clock
- Crystal-controlled with battery backup for power failure duration up to one year

Remote Site Capability
- One to 99 sites, coded protocol

Control Terminal Configuration
- Up to 4 per Remote Terminal, one functioning as master Control Terminal

Command Lines
- Programmable momentary, momentary pulse, or latching
- Command response time: 750 ms to implementation, nominal*
- Momentary pulse duration: 0.1 to 6.4 seconds
- Open collector output standard (will switch up to 250 mA at 48 Vdc, user-supplied voltage)
- Front-panel tally-back LED indicators
- 0 to 256 lines per site in 16-line increments, 32 lines per DACU-1 standard, 16 lines per stand-alone Remote Terminal standard
- Optically-isolated and relay interfaces optional

Status Channels
- User-programmable N.O./N.C., momentary or latching, alarm or event indication
- Status, response time: 500 ms, nominal* Command Unit
- TTL-compatible input standard (+5 Vdc switched by external contacts)
- 0 to 256 channels per site in 16-channel increments, 32 channels per DACU-1 standard, 16 channels per stand-alone Remote Terminal standard

Telemetry Channels
- One-person digital calibration, via Remote Terminal keyboard
- Fully tolerance alarmed, dual high and dual low limits
- Absolute, linear, power-to-linear conversion, indirect power, ratio, digital word calibration
- Full 4-digit LED display with decimal point and polarity
- Resolutions: one part in 1024
- Overall measurement accuracy: better than 0.5%
- Response time: 500 ms, nominal*, independent of channel load
- Up to 64 channels per DACU
- Full scale input level: ±300 mV minimum, ±1 V minimum recommended, ±4.5 Vdc maximum (field-alterable to ±10 Vdc maximum)
- 0 to 256 channels per site in 16-channel increments, 32 channels per DACU-1 standard, 16 channels per stand-alone Remote Terminal standard
- Digital telemetry input optional

Aural Alarms
- Control and Remote Terminals, defeatable and remoteable

Fail-Safe
- Control relay relaxes after 3 minutes of no control
- Telemetry: optional, with internal 3-hour timer for up to 6 transmitters

Maintenance Override
- Remote Terminal front-panel button
- Provides Remote Terminal "go home" relay closure and Control Terminal LED alert indication

Number of Data Interconnection Links
- Up to 4 per Remote Terminal (8 with Dialup)
- Up to 8 per Control Terminal (8 with Dialup)
- 2 per Terminal supplied standard
- Up to 2 per Control Terminal/Remote Terminal pair

Data Transmissions
- 7-bit ASCII with parity plus Longitudinal Redundancy Character Check
- 1200 baud each direction standard
- Two-way, non-simultaneous, via FSK, 1200/2200 Hz
- Higher speed optional

Wire Interconnection
- 2-wire or 4-wire, 600 ohm, balanced
- Series 3002 basic unconditioned data channel per Bell System Technical Reference Publication 41004 (FCC tariff No. 260) for 1200 baud (standard)
- 2-way, non-simultaneous
- Nominal send level: 0 dBm; minimum receive level: -30 dBm
- RS-232 interconnection optional

Radio Interconnection
- Single or duplex, internal subcarrier systems in standard frequencies between 26 and 185 kHz
- Nominal level: 1.5 V p-p at 2 k ohm
- Specify frequency and exact radio link when ordering

Operating Temperature Range
- 0°-50°C

Power Requirements
- Control Terminal, Remote Terminal, DACU each: 120/240 Vac, 50/60 Hz, 100 Watts, nominal
- 26V/48 operation optional

Physical Size
- Control Terminal, Remote Terminal, DACU each: 17.8 cm H x 48.3 cm W x 39.4 cm D
- NEMA enclosures optional

*Nominal response times based on basic system with 2 modems and no options

Specifications subject to change without notice

Printed in the USA 1/92

Moseley

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ANTENNA MONITORS
1900 SERIES FCC ID: IJ3PI1900

DESCRIPTION

When compared to previous generation equipment, the 1900 series Antenna Monitors provide better performance over a wider dynamic range with virtually no modulation effects. Separate measuring circuits are employed for each tower. Remote control interfacing is greatly simplified because these monitors provide simultaneous outputs for the measured Phase Angle and sample Current Ratio of each tower. Therefore, it is not necessary for the remote control system to select a specific tower prior to interrogating a particular telemetry output port. To facilitate maintenance and system re-configuration, all active circuits are packaged on plug-in printed circuit modules which are accessible at the rear panel of the monitor. 1900 series Antenna Monitor metering capacity (number of towers) may be increased or decreased by adding or removing individual metering modules.

1901	**Antenna Monitor** (Two Towers, 1 to 3 Patterns) Monitor unit with front panel display, local operating controls, and complete interface capability to remote control systems.	**$ 5,045.00**
1902	**Monitor Display** Display unit for extension manual control and reading of the 1901 or 1903 Monitors. (1-3/4" Panel Height)	**$ 1,380.00**
1903	**Antenna Monitor** (Two Towers, 1 to 3 Patterns) Monitor unit with no display or controls, for control from a Type 1902 Monitor Display, with complete remote control interface.	**$ 4,270.00**
1910	**Tower Input, Metering Board** (1 ea Required for each tower) Circuit Card for one Tower input. Provides full metering support and outputs for Phase, Ratio and Amplitude for one Tower.	**$ 660.00**

ORDERING INSTRUCTIONS

A 1901 or 1903 Antenna Monitor consists of a chassis with power supplies and a control board which can support up to (12)Type 1910 Tower Input Metering Boards. The basic unit is supplied with two (2) 1910 Boards. A four tower array would require two additional 1910 Boards for a total of four 1910 Tower Inputs. Potomac Instruments will preprogram a 1900 series monitor and conduct it's final tests at the station frequency if the following information is specified at the time of the order:

Number of Towers,	(2-12)	_____	Twrs.
Number of Patterns,	(1-3)	_____	Pats.
Reference Tower for each Pattern		_____	D/N/3rd
Operating Frequency		_____	Khz
Sampling Line impeadance,	(50 or 75 ohms)	_____	Ohms
Input Connector Type,	(UHF or N)	_____	
AC Power,	(117 or 230 VAC)	_____	VAC

TRANSMITTER CONTROL EQUIPMENT

RC-16+ **Remote Control System:** **$ 8,490.00**

Includes SU-16 Studio Unit (16 channels): This unit contains the master controller and time clock. It sends commands to the TU-16 unit and receives data from it. Front panel indicators provide channel number, telemetry data, time, and status indications. It is pre-programmed for each station according to user specifications. It provides manual or automatic surveillance and control at the option of the operator and includes Auto-Logging software.

Includes TU-16 Transmitter Unit (16 channels): This unit accepts analog telemetry and status inputs and provides relay closure control outputs. It receives its instructions from the studio unit and operates the relays to control each function. Individual telemetry adjustments are provided for one person calibration under local control.

1500 PC **PROGRAMMABLE CONTROLLER:** **$ 7,780.00**

Includes Central Processing Unit; battery backed Clock and Calender; internal Diagnostics & Operating System firmware; Non-volatile EEPROM for storing user defined operating modes (up to 16 separate modes can be programmed); integral panel mounted 5 inch CRT Display; Programming via menu selection (key-lock access); Communications Interface Board, (2 wire or 4 wire audio [standard], Sub-carrier Generator [extra]); 16 Channel auto-ranging A/D Telemetry Input board; High and (or) Low telemetry limit alarms for each channel and each mode; 16 Channel opto-isolated Status Input board; Status alarms; 8 Channel control Relay Interface board (16 separate form "A" relays); IBM-PC® compatible Parallel Printer Port; IBM-PC® compatible TTL Monitor Port; Serial (high speed) Data Output port (for VDU option, see below); Form "C" Failsafe relay with timeout circuit; automatic dial telephone link backup (requires auto originate and auto answer modems, see TIO option below); Control Mode alarms; removable plug type connectors for all inputs and outputs; 2 expansion slots for future system options.

The 1500 PC may be used as a "stand alone" intelligent controller and (or) autologging system or it may be linked to the 1510 ST Studio Terminal viafull duplex land line or radio link for remote control applications.

1510 ST **STUDIO TERMINAL:** **$ 2,505.00**

Provides control point I/O and interface for access to and control of the 1500 PC from a remote location. Includes: Audio Modem Board; 3-1/2 digit LED telemetry display; 2 digit LED Channel Number display; 16 Status indicators (2 X 8 LED matrix); Channel Select controls; Raise (On) and Lower (Off) controls; Mode Selection (Automatic or Manual operation); IBM-PC® compatible Parallel Printer Port (Note: Auto Logging printer may be located at Control Point or Transmitter Site - or both sites. Interchangeable printer interface card may be installed at either site. Single printer interface card provided with 1500 PC, second card must be purchased separately if dual site logging is desired.); Serial (high speed) Data Output port (for VDU option, see below); requires 5-1/4 inches of rack space.

The RF-3560B telephone interface unit and the RF-3565 access unit comprise the new long-range HF telephone system

The RF-3560B is designed for unat-

The new RFA-4027 SMA technician's adapter kit by RF Industries includes the

BROADCAST ELECTRONICS, INC.

Appendix F

Typical Tower Light Monitoring Systems Suitable for Unattended Operation

1740 RR RELAY MODULE: **$ 330.00**

This module functions as a 4 pole form "C" relay with opto-isolated inputs that can be activated by input commands from a contact closure or a DC (Voltage or Current) source or an AC (Voltage or Current) source or a (balanced or unbalanced) audio source. The relay may be strapped to operate as either latching or non-latching. If used as a latching relay, the "SET" and "RE-SET" commands may be from any one of the inputs mentioned above. Depending upon user preference, the relay may be normally de-energized or normally energized for power fail response or failsafe control of external circuits. AC and DC control voltages may be between 2 volts and 300 volts. Current sensitivity and voltage sensitivity are controlled by changing the values of on board resistors. Each contact of the relay is rated at 2 A, 120 VAC or 28 VDC. The poles of the relay may be paralleled for improved reliability.

1740 RR (AC) Same Unit with AC Power Supply and Chassis **$ 590.00**

1750 CS COMPARATOR / STATUS: **$ 430.00**

4 channel multifunction module with comparators (adjustable reference voltage each channel), logic circuits and open collector outputs which may be used to: convert normal "HIGH" or normal "LOW" voltage status to open collector output; provide for combining status conditions for logic "OR" or logic "AND" alarm conditions; detect loss of audio and provide status alarm; provide multiphase power line voltage monitor and status alarm.

1750TLM TOWER LIGHT MONITOR: **$ 550.00**

4 Channel "Stand-alone" module for Tower Lignt Monitoring applications. It is supplied in an aluminium chassis with an AC power supply. (Not compatible with the 1701-UC chassis.) Requires a current sample input from each measured circuit. (Torroid transformer Mdl 12525 recommended.)

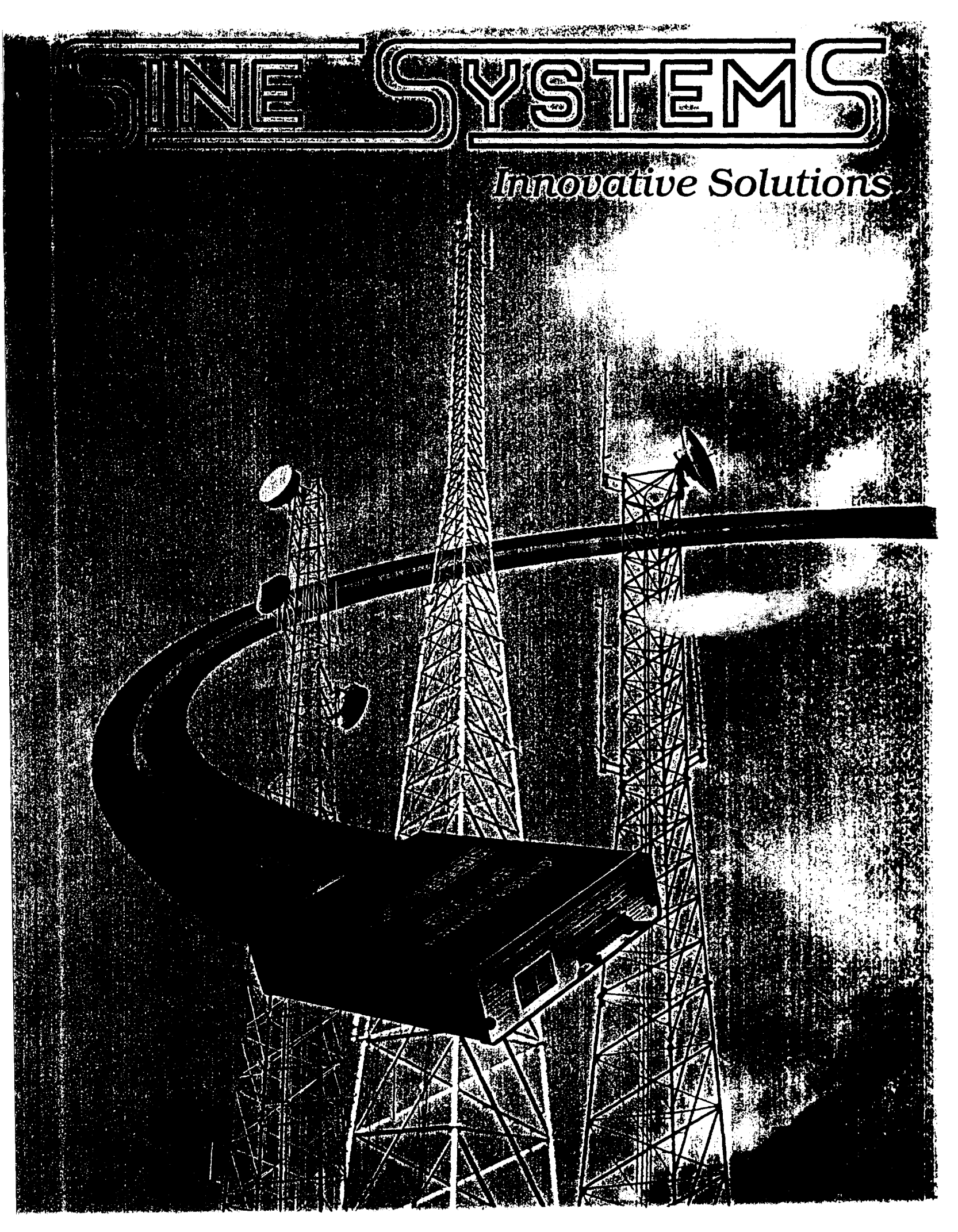
TORROID SAMPLE TRANSFORMER (Mdl 12525) **$ 32.00**

1760 XP EXPERIMENTOR PROTOTYPE BOARD: 16 Pin I/O (16) **$ 220.00**
32 Pin I/O (32) **$ 240.00**

This board provides a versatile "Breadboard" pad and track pattern for one of a kind or prototype interface applications. The board may be provided with either 16 or 32 terminal board input/output connector.

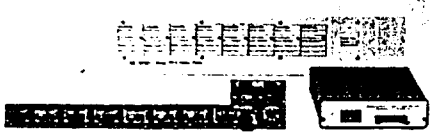
SINE SYSTEMS

Innovative Solutions



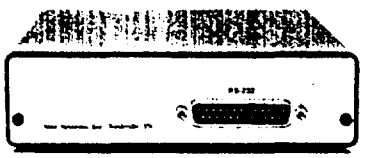
SINE SYSTEMS

Walkaway Specialist



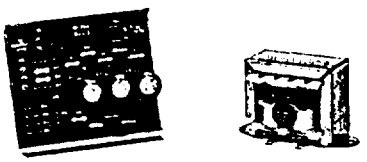
Control and monitor your transmitter from any telephone with the famous RFC-1: the world's most affordable fully-featured dial-up remote control. It speaks to you with a natural human voice! It can also telephone you to report out-of-tolerance conditions and can automate transmitter power/pattern changes. The basic system consists of one RFC-1/B and one RP-8 eight-channel relay panel. Add more RP-8s for more channels. Add the optional SP-8 heavy-duty surge protection system and we cover lightning damage under the one-year warranty!

RFC-1/B RP-8 SP-8



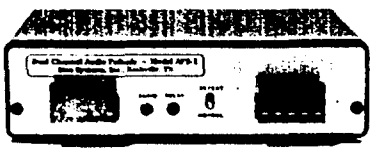
Let your RFC-1 print your readings with the RS-232 option and a serial printer! The RS-232 kit contains a small PC board and a longer case to accommodate the added 25 pin "D" connector. It's easily installed in about 10 minutes. Add two modems and it can also print readings remotely (at your studio) without using a computer. Multiple RFC-1 sites can log into the same printer! Of course, computer operation is also an option and you can design your own sophisticated facilities control system. All the regular (voice) operation capabilities are still available after installation of the RS-232 option.

RS-232



Are your tower lights on? The answer to this question is important to public safety—and the FCC. Unlike other devices which tell you only if the lights are on or off, the ACM-1 AC Current Monitor allows you to detect a change in average lighting current as small as 1%. This is sufficient to spot a single-bulb-failure in most systems. One ACM-1 can monitor up to 70 amperes and works equally well on beacons, side-lights, and combination beacon/side-light circuits. The ACM-1 is entirely passive and consists of a current-sampling transformer and a small PC board that converts this signal to a DC voltage which is fed to the RP-8 telemetry input.

ACM-1



The AFS-1 Audio Fail-Safe is a self-contained device that is typically used to trigger an alarm or terminate transmission if program audio fails. The AFS-1 can monitor one or two audio signals and provide a relay contact-closure for as long as either audio signal is present. When neither audio signal is present for an adjustable delay period (7 seconds to 4.5 minutes) the relay contact opens and remains open until one or both of the audio signals return. The output relay is rated (6 amperes/120 volts) to allow direct control of most equipment.

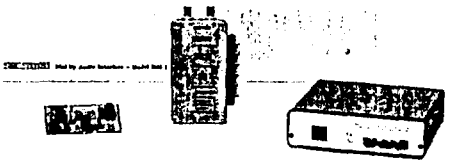
AFS-1

The Thermal Sentry is a unique and very powerful transmitter-monitoring tool. It can assess the overall operating condition of a transmitter as well as provide important early-warning information about conditions that, if uncorrected, could lead to down-time and costly damage. To accomplish this, the Thermal Sentry uses two precision air-temperature sensors; one installed at the cooling-air intake and the other at the cooling-air exhaust of a transmitter. The temperature difference is displayed on a green LED display on the front panel. Remote metering outputs are provided for intake, exhaust and differential temperature as well as an alarm output which activates when the differential exceeds a preset value.

Thermal Sentry

• EBS Compliance Tools
• Dial-up Remote Broadcast
• Remote Transmitter Control & Monitoring
• Program Automation Accessories & Studio Aids

The DAI-1 Dial-Up Audio Interface provides an array of features unparalleled in the industry. It combines an autocoupler, a dial-out alarm, two AGCs, a DTMF operated equipment controller and an audio switcher into one affordably priced device. It is commonly used as a tool for "walkaway" EBS compliance. Another popular application is to allow "dial-up" remote broadcasts when the studios are unmanned. The DAI-RP provides a space to rack-mount the DAI-1, a power supply, a screw-terminal interface module and five general-purpose relays for equipment control and audio switching. The optional DB-1 50 millisecond delay board prevents DTMF tones getting on the air. The optional CI-1 Composite Insertion Module is available for use when discrete audio is unavailable.



DAI-1

Radio has always meant "time and temperature." The Time-Temp Thing is a rack-mounted device that can speak the time, the temperature, or both, upon command from your automation system. It even automatically changes the way it speaks the information so it doesn't sound like a machine. Interfacing the Time-Temp Thing to most automation systems is simple. A contact-closure or open-collector output is all it needs to make it speak. When the Time-Temp Thing is finished speaking it gives a momentary contact-closure back to the automation system. A brief audio demonstration is available on our Fax-On-Demand.

Time-Temp Thing

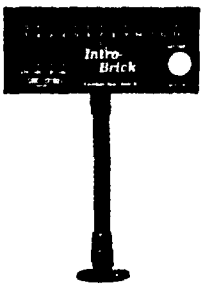
A light bulb in a little box that says "ON AIR" was a great idea—70 years ago! Welcome in the 21st century with a totally new way to say "ON AIR!" Our MBC-1, combined with a locally-purchased off-the-shelf electronic message-board, results in a versatile and attractive studio display system. One MBC-1 can drive several message-boards and is easy to install. The MBC-1 monitors up to 15 control-room devices and can display a unique message for each one. Here are a few possibilities: FIRE ALARM, TRANSMITTER OFF, ON AIR, EBS ALERT, SECURITY ALERT, WEATHER BULLETIN, HOTLINE, MUSIC ENDING, and AUDIO FAILURE. The MBC-1 is a great way to improve the appearance and efficiency of your broadcast and production studios.

MBC-1

The OC-2 Two-Channel Optocoupler is an accessory for the MBC-1 that can provide ground isolation for two inputs. The MBC-1 contains a rugged, ground-referenced interface circuit that can directly interface the vast majority of broadcast equipment. Yet, in some cases, ground isolation may be desired or even required. The OC-2 provides this capability. Each channel contains an optional AC coupling capacitor on the LED side which can allow direct interface to telephone lines for ring detection.

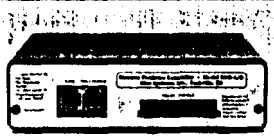
OC-2

Spiff-up your studios and earn the thanks of your air personalities with Intro-Brick. Intro-Brick is a studio countdown timer with a bright-red LED bar-graph display. It is specially designed to give air personalities a visual indication of the time remaining on an instrumental intro. This allows the air-personality to concentrate on other tasks without fear of stepping on the vocal. The Intro-Brick is easily set to the intro length with a rotary knob on the front panel. It automatically starts its countdown from up to six equipment sources. Available in either a six or thirteen-inch goose-neck model, it will be a welcome addition to your control room or production studio.



Intro-Brick

SINE SYSTEMS Technical Specifications

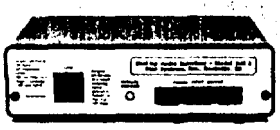


RFC- 1/B

Power Consumption:	12VAC @ ~550mA (max)
Dimensions:	6 x 1.5 x 6.5 for RFC-1/B and 19 x 3.5 x 1.75 for RP-8 (W x H x D in inches)
Connections:	Telephone and telephone line via RJ11C modular
	Telemetery and control via depluggable screw terminals
Telemetry Input Voltage:	+/- 1VDC (min), 16VDC (max)--offset from ground 30VDC (max)
Relay Contact Ratings:	120VAC @ 5A resistive or 2A inductive

RS-232

Power Consumption:	Increases RFC-1/B current consumption by 60mA when operating
Dimensions:	Expands RFC-1/B to 6 x 1.5 x 9 (W x H x D in inches)
Connections:	Male 25 pin "D" —Transmit data on 2, Receive data on 3, Signal ground on 7
Protocol:	75 to 9600 baud, 8 data bits, 1 stop bit, no parity, Hayes® compatible 'AT' Command-set



DAI-1

Power Consumption:	12-15VDC @ ~80mA (typical)
Dimensions:	6 x 1.5 x 5.5 (W x H x D in inches)
Connections:	Telephone line via RJ11C modular
Audio Input:	-10dBv to +4dBv
Audio Output:	-4dBv to +4dBv balanced (adjustable) @ 600Ω load impedence
Control Output:	8 open collectors sink 12VDC @ 350mA each, not to exceed 1.0A total 'on' @ 12VDC

AFS-1

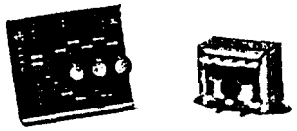
Power Consumption:	12VAC @ ~150mA (max)
Dimensions:	6 x 1.5 x 5.5 (W x H x D In inches)
Connections:	All connections via depluggable screw terminals
Audio Input:	-16dBv minimun
Relay Contact Ratings:	120VAC @ 5A resistive or 2A inductive

Time-Temp Thing

Power Consumption:	12-15VDC @ ~80mA (max)
Dimensions:	19 x 1.75 x 6 (W x H x D In inches)
Connections:	All construction via depluggable screw terminals
Temperature Sensing:	-40°F to 150°F in 1° increments
Audio Output:	+4dBv balanced nominal @ 600Ω load impedence
Relay Contact Ratings:	24VDC @ 500 mA

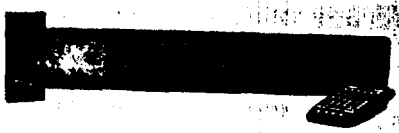
Thermal Sentry

Power Consumption:	12-15VDC @ ~200mA (max)
Dimensions:	19 x 1.75 x 6 (W x H x D in inches)
Connections:	All connections via depluggable screw terminals
Temperature Sensing:	0°F to 199°F in 0.1° increments
Analog Output:	10mVDC (precalibrated) per degree Fahrenheit
Relay Contact Ratings:	24VDC @ 500mA (normally open or normally closed programmable)



ACM-1

Dimensions:	3.5 x 3 x 1.5 (W x H x D in inches)
Connections:	All connections via depluggable screw terminals
Input Current:	1-70A user adjustable
Output Voltage:	1-5VDC @ 3kΩ load impedence, scaled by input current
Averaging Period:	Approximately 2 minutes



Message Board and Controller

Power Consumption:	12-15VDC @ ~100mA (max)
Dimensions:	6.5 x 2.75 x 1.5 (W x H x D in inches)
Connections:	All connections via depluggable screw terminals
Source Inputs:	Momentary or latched contact closure, or logic level 'low'
Serial Input Protocol:	9600 baud, 8 data bits, 1 stop bit, no parity (for programming inputs)
Driver Output:	Single controller can operate 1 to ~30 boards depending on interconnect length

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